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DECLARATION

I, Hideko SUEOKA, a subject of Japan residing at 4-31-20, Koenji-kita, Suginami, Tokyo, 166-0002 Japan, solemnly and sincerely declare:

That I have thorough knowledge of Japanese and English languages; and

That the attached pages contain a correct translation into English of the specification of the following Japanese Patent Application:

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Signed this 13th day of March, 2007

Hideko SUEOKA

Hideko SUEOKA

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[Application Fees]	
[Prepayment Registration No.]	013387
[Amount of Payment]	21000

[List of Documents Attached]

[Name of Document]	Specification	1
[Name of Document]	Drawings	1
[Name of Document]	Abstract	1
[No. of General Power of Attorney]		9101363
[Proof]		Required

[Name of Document] SPECIFICATION

[Title of the Invention] ENDOSCOPE

[Claims]

[Claim 1] An endoscope comprising:

an elongated inserting portion; and

an operating portion that is arranged at the rear end of the inserting portion and includes a grip portion gripped by an operator,

wherein the operating portion has therein a plate frame and the plate frame has a notch portion to arrange an image pickup unit.

[Claim 2] The endoscope according to Claim 1, wherein the image pickup unit has rear end surfaces of image guiding fibers inserted in the inserting portion, an image forming optical system, and an image pickup device so that an optical image transmitted to the rear end surfaces of the image guiding fibers are formed on the image pickup device for photoelectrically converting the image via the image forming optical system.

[Claim 3] The endoscope according to Claim 1, wherein the image pickup unit is arranged substantially in parallel with the shape of the operating portion in the longitudinal direction thereof.

[Claim 4] The endoscope according to Claim 1, wherein the image pickup unit is fixed to the plate frame via an attaching member.

[Claim 5] The endoscope according to Claim 2, further comprising:

an image pickup device holding unit that holds the image pickup device;

an optical system holding portion that holds the image forming optical system;

a fitting portion which fits the optical system holding portion and the image pickup device holding portion while advancing and returning them so that the image pickup device can pick-up the optical image output from the image forming optical system; and

waterproof means that is arranged to the fitting portion.

[Detailed Description of the Invention]

[0001]

[Technical Field of the Invention]

The present invention relates to an endoscope including an operating portion having therein an electric device such as an image pickup unit.

[0002]

[Description of the Related Art]

In recent years, an endoscope has widely been used in medical and industrial fields. Further, an endoscope is commonly used, having therein an image pickup unit incorporating an image pickup device which simply records an endoscope image obtained by the endoscope and easily edits and reuses it.

[0003]

A micro-sized image pickup device is developed. In the case of an endoscope having an inserting portion with a thin diameter for the bronchi, the image pickup device is arranged at the edge portion of the inserting portion and then the outer diameter of the inserting portion is larger.

Therefore, an endoscope having an image pickup device in an operating portion is disclosed. For example, Japanese Unexamined Patent Application Publication No. 11-23983 discloses the above-mentioned endoscope as a well-known art.

[0004]

According to the well-known art, the operating portion has the image pickup device near at the rear end thereof, and an optical fiber is inserted in the inserting portion so as to transmit an optical image to the rear end (base end) of the optical fiber at which the image pickup device is arranged. The optical image of a subject is formed onto the image pickup device via an image pick-up optical system arranged facing the rear end of the optical fiber.

[0005]

According to the well-known art, the rear end of the optical fiber and an image pickup unit (TV camera) are incorporated in the operating portion on the back side of a portion branched to a universal cord.

[Patent Document 1]

Japanese Unexamined Patent Application Publication No. 11-23983

[0006]

[Problems to be Solved by the Invention]

According to the well-known art, the image pickup unit is provided in the operating portion near the rear end thereof. However, the loss of the amount of light caused by the optical fiber is reduced and the image with a higher S/N ratio is obtained.

However, the endoscope includes, on the front end side of the operating portion, the function for inserting and absorbing a wire for bending operation and a treatment tool, and the endoscope has not only the endoscope and other components but also the internal structure such as the plate frame in the operating portion so as to fix the components and to ensure the necessary strength.

The arrangement of the plate frame does not enable compact accommodation of the image pickup unit.

[0007]

(Object of the Invention)

The present invention is devised in consideration of the above points, and it is an object of the present invention to provide an endoscope having the internal structure to ensure the necessary strength, in which an image pickup unit can be compactly accommodated with a simple structure.

[0008]

[Means for Solving the Problems]

An endoscope comprises:

an elongated inserting portion; and

an operating portion that is arranged at the rear end of the inserting portion and includes a grip portion gripped by an operator.

In the endoscope, the operating portion has therein a plate frame and the plate frame has a notch portion to arrange an image pickup unit. By providing the plate frame in the operating portion and arranging the image pickup unit with the notch

portion arranged to the frame, the necessary strength can be ensured and the image pickup unit can be compactly accommodated.

[0009]

[Description of the Embodiments]

Hereinbelow, a description will be given of embodiments of the present invention with reference to the drawings.

(First embodiment)

Figs. 1 to 5 relate to the first embodiment of the present invention, Fig. 1 shows the appearance of an endoscope according to the first embodiment, Fig. 2 shows the internal configuration of an inserting portion on the edge side thereof, Fig. 3 shows the internal configuration and the like of an operating portion, Fig. 4 shows the internal configuration on the front side shown in Fig. 3, and Fig. 5 shows the configuration of an image pickup unit.

[0010]

Referring to Fig. 1, an endoscope 1 according to the first embodiment of the present invention comprises an elongated inserting portion 2 with flexure, which is inserted in the body cavity, an operating portion 3 arranged at the rear end of the inserting portion 2, a universal cord 4 extended at the base end (near end) from the side portion of the operating portion 3, and a connector 5 arranged to the end (far end) of the universal cord 4. A light guiding cap 6 is projected from the end of the connector 5, and is attached to a light source device (not shown). Thus, illumination light is supplied from the light source device and the illumination light is transmitted by light guiding fibers inserted in the endoscope 1. The light is output from an illumination window at the end (edge) of the inserting portion 2 and an examination target portion such as the affected part is illuminated.

[0011]

An electric connector portion 7 is arranged on the side surface of the connector 5. The electric connector portion 7 is attached to a video processor via a connecting cable (not shown) attached thereto, and the video processor is thus electrically connected to an image pickup device, which will be described later,

included in the endoscope 1. The video processor applies a driving signal to the image pickup device, performs the signal processing of an image pick-up signal picked-up by the image pickup device, and generates a video signal. The video processor further outputs the generated video signal to a monitor (not shown), and displays an image picked up by the image pickup device on a display surface of the monitor.

[0012]

A hard edge portion 8, a bending portion 9 that is freely bent, and a flexible portion 10 with flexibility are sequentially arranged from the edge side of the inserting portion 2, and the rear end of the flexible portion 10 reaches the operating portion 3. The operating portion 3 has, on the front end side thereof, a grip portion 11 that is gripped by an operator. The grip portion 11 includes, at the front end thereof, a connecting member for connection to the inserting portion 2.

[0013]

A bending lever 12 is arranged on the rear side (upper end or the top portion) of the grip portion 11 so that the grip portion 11 is operated by the gripping hand. The bending lever 12 is operated, the bending portion 9 is bent, and the edge portion 8 is thus vertically bent. The endoscope 1 according to the first embodiment has the structure of the bending portion 9 which can be bent only in the vertical direction so that the inserting portion 2 has the thin diameter.

A video switch portion 13 is arranged at the rear end of the operating portion 3 for the remote operation of freeze and release, on the video processor side.

[0014]

An inserting slit 14 of a treatment tool such as a clamp is arranged near the front end of the grip portion 11. The treatment tool inserted from the inserting slit 14 can be inserted in a channel arranged in the longitudinal direction of the inserting portion 2.

Light guiding fibers (not shown) and a signal cable connected to the image pickup device are inserted into the universal cord 4 extended in the direction perpendicular to the side surface of the operating portion 3 therefrom.

[0015]

Next, the configuration of the inserting portion 2 on the edge side thereof will be described with reference to Fig. 2.

Referring to Fig. 2, the edge portion 8 is formed by an edge portion main body 16 which is made of a hard member such as metal with substantially cylindrical shape. A plurality of holes are provided in the axial direction of the edge portion main body 16, and the holes are fixedly filled with various components.

[0016]

For example, an objective lens system (objective optical system) 18 is fixed to the hole of an observing window via a lens frame 17 or the like. Edge surfaces of image guiding fibers 19 having a function of transmitting means of an optical image (optical information) are fixed at the position for forming the image of the objective lens system 18. The image guiding fibers 19 transmit the optical image formed onto the edge surface thereof to a rear end surface (output end surface) arranged in the operating portion 3.

[0017]

The edge of a flexible tube 21 forming a channel 20 inserted in the inserting portion 2 is fixed to the rear end of the hole provided adjacently to the observing window via a cap member 22. The rear end side of the channel 20 is branched in the halfway, one branched channel 20 is connected to the inserting slit 14, and the other branched channel 20 is extended to the rear end side of the operating portion 3. The edge of the channel 20 is opened via the hole of the edge portion main body 16.

[0018]

Light guiding fibers (not shown) are inserted in the inserting portion 2 and the edges of the light guiding fibers are fixed to the hole for illuminating window of the edge portion main body 16, and output illumination light from the fixed edge surface. The light illuminates the subject within the observing range of the objective lens system 18.

[0019]

A bending piece (node ring) 23 at the last end with substantially circular shape

is fixed to the rear end of the edge portion main body 16, and the edge of the bending piece 23 as the succeeding one is rotatably connected to the rear end of the bending piece 23 via a rotating and connecting member using a rivet 24 or the like at the position in a predetermined direction such as the right or left direction. Thus, the many bending pieces 23 are rotatably connected in the longitudinal direction of the inserting portion 2 and the bending portion 9 is formed.

[0020]

A pair of bending wires 25 is inserted along the position apart from the connecting position using the rivet 24, for example, the position in the vertical direction, and the edge of the bending wire 25 is strongly fixed to the endmost bending piece 23 by waxing.

[0021]

The rear ends of the pair of bending wires 25 are fixed to a drum 32a forming a drum unit 32 as a bending mechanism of the operating portion 3 as shown in Fig. 3. The drum 32a is rotated by rotating the bending lever 12, extends one of the pair of the bending wires 25, and releases the other of the pair of the bending wires 25. Thus, the bending portion 9 is bent to the bending wire 25 side on the extended side.

[0022]

Referring to Fig. 2, the bending portion 9 is covered with a net tube 28 and a bending rubber tube 29 made of elastic resin which covers the outside of the net tube 28.

Next, a description is given of the operating portion 3 and the grip portion 11 with reference to Figs. 3 to 5. Fig. 3(A) mainly shows the internal configuration of the operating portion 3 on the rear end side, Fig. 3(B) shows a diagram in a direction of an A arrow shown in Fig. 3(A), Fig. 4(A) shows the internal configuration of the periphery of the grip portion on the front side of the operating portion, and Fig. 4(B) to 4(E) show cross-sections by a C-C, E-E, F-F, and G-G lines shown in Fig. 4(A), respectively.

[0023]

Referring to Fig. 3, the rear end side of the operating portion 3 is covered with

exterior members 31a and 31b of the operating portion. A video switch unit 13 is attached at the rear end of the operating portion 3. The drum unit 32 forming the bending mechanism is arranged to one side surface of the rear end of the operating portion 3. The drum unit 32 is connected to the bending lever 12. A bending-preventing member 33 is arranged on the side surface facing the one side surface of the operating portion 3 having the drum unit 32, and the universal cord 4 is extended by the bending-preventing member 33.

[0024]

A connecting portion 36 is formed on the front end sides of the exterior members 31a and 31b of the operating portion, and the exterior members 31a and 31b of the operating portion are connected to an exterior member 35 of the grip portion to be resolved. That is, in the connecting portion 36, the rear end of the exterior member 35 of the grip portion which covers the grip portion 11 is fit into the exterior members 31a and 31b of the operating portion via a watertight O ring 37. The exterior member 31b of the operating portion is connected to the exterior member 31a of the operating portion via the watertight O ring 34 to be resolved each other.

[0025]

Referring to Fig. 4(A), a bending-preventing member 38 is arranged at the front end of the exterior member 36 of the grip portion and a flexible tube of the inserting portion 2 is connected to the bending-preventing member 38. The inserting slit 14 is arranged near the front end of the exterior member 35 of the grip portion so as to insert the treatment tool. The inserting slit 14 becomes the channel 20 which is in the conjunction of an absorbing tube 40 via a branching member 39. Fig. 4(B) shows the configuration of the periphery of the branching member 39.

[0026]

The exterior member 35 of the grip portion accommodates the absorbing tube 40, the above-mentioned image guiding fibers 19, the light guiding fibers (not shown), and the coils 43 (refer to Fig. 3) which advance and return in the wire 25 for the bending operation and are inserted in the wire 25.

[0027]

The components are protected by the exterior member 35 of the grip portion. Further, a plate frame 45 made of a hard member such as metal is arranged as an internal structure in the exterior member 35 of the grip portion. Thus, the modification of the exterior member 35 of the grip portion is suppressed and the components are protected without fail.

The frame 45 is substantially rectangular-plate-shaped. Referring to Fig. 3(A), the rear end of the frame 45 is L-bent, and fixed to the exterior member 31a of the operating portion near the connecting portion 36 by a screw 46.

[0028]

Referring to Fig. 3(B), the frame 45 has a notch portion 45a which is formed by notching a part of the rear end of the substantially rectangular-shaped frame 45 from the side direction. An electrical unit, specifically, an image pickup unit 47 is arranged to a space formed by the notch portion 45a, thereby compactly accommodating the image pickup unit 47 in the grip portion 11.

[0029]

Referring to Figs. 3(B), 4(A), and 5, the frame 45 is arranged in the longitudinal direction thereof near in the center of the grip portion 11. The frame 45 has the notch portion 45a which is formed by notching a part thereof on the rear end side at the deviated position in the exterior member 35 of the grip portion. The image pickup unit 47 is arranged to the desired position of the notch portion 45a.

[0030]

The image pickup unit 47 is arranged in parallel with the longitudinal direction of the operating portion 3. Specifically, referring to Fig. 5, the image pickup unit 47 is arranged in parallel with the exterior member 35 of the grip portion along the inner shape thereof.

[0031]

As will be described later, the exterior member 35 of the grip portion has components such as the wire 25 for the bending operation. The image pickup unit 47 is arranged in parallel with the inner surface of the exterior member 35 of the grip

portion adjacently thereto, thereby efficiently arranging the image pickup unit 47 while preventing the components.

[0032]

Referring to Fig. 5, the image pickup unit 47 comprises: a hard fiber supporter 52 which holds a hard cap 51 for protecting the rear ends of the image guiding fibers 19 with substantially cylindrical shape; a relay optical system 53 which is arranged facing the rear end surface (output end surface) 19a of the image guiding fibers 19 and has a function for forming an image with a desired magnification; and an image pick-up portion 55 which is arranged at the position for forming the optical image transmitted to the rear end surface 19a of the image guiding fibers 19 by the relay optical system 53 and which has a charge coupled device (hereinafter, abbreviated to a CCD) 54 as an image pickup device having a function for photoelectrically converting the image. A signal cable 56 connected to the image pick-up portion 55 is extended on the rear side from the rear end of the image pick-up portion 55.

[0033]

The fiber supporter 52 for holding the cap portion 51 near the rear end of the image guiding fibers 19 is fixed to a fixing frame 57 arranged to the outer periphery thereof at two positions in the longitudinal direction. Referring to Fig. 4(D), one end portion side of the fiber supporter 52 is positioned, adjusted, and fixed by three screws 58 from three peripheral directions. Referring to Fig. 5, another end portion side of the fiber supporter 52 is fixed by screws 58' from three peripheral directions.

[0034]

Referring to Fig. 4(E), the fixing frame 57 is fixed to an outer frame 59 on the outer-peripheral side by a screw 60. The fixing frame in of the image pickup unit 47 is fixed to an L-shaped attaching member 63 by a screw 62.

[0035]

The relay optical system 53 facing the output end surface 19a (refer to Fig. 5) of the image guiding fibers 19 held by the fiber supporter 52 is attached to the lens frame 65. The front end side of the lens frame 65 is fit into the outer frame 59, and a CCD frame 54a of the CCD 54 is positioned, adjusted, fixed to the rear end side of

the lens frame 65. That is, the relay optical system 53 adjusts the CCD 54 so that the image pick-up surface of the CCD 54 is positioned at the position for forming the image with predetermined size.

[0036]

A portion at which the lens frame 65 is fit into the outer frame 59 is fixed by adjusting the focusing of the relay optical system 53 in the optical axis direction by using a screw 66. The optical image transmitted to the output end surface 19a of the image guiding fibers 19 is adjusted so that it is formed onto the image pick-up surface of the CCD 54 via the relay optical system 53 clearly with predetermined size. Then, the image pickup unit 47 is attached, by using the attaching member 63, near the notch portion 45a which is formed by notching the frame 45.

[0037]

In this case, the fixing position of the fiber supporter 52 is adjusted, by using the screw 58, from three peripheral directions. As mentioned above, the central axis of the output end surface 19a of the image guiding fibers 19 matches the optical axis of the relay optical system 53 and then the image pickup unit 47 is attached to the frame 45 by the attaching member 63.

[0038]

Inserted into the grip portion 11 are components such as the image guiding fibers 19, the absorbing tube 40, and the coil as a guiding member into which the wire 25 for bending operation is inserted. The coil and the like are held by a coil supporter 67 fixed to the frame 45 as shown in refer to Fig. 4(C). Referring to Fig. 4(C), the frame 45 has the end portion on the bottom in the drawing which is L-bent, with predetermined strength in the direction vertical to the plate surface.

[0039]

According to the first embodiment, the image pickup unit 47 is attached (fixed) to the frame 45 by the L-shaped attaching member 63. With the structure for attaching the image pickup unit 47 to the frame 45 via the attaching member 63, the attaching member 63 is shaped to match the attachment of the image pickup unit 47, and an attaching portion of the attaching member 63 and the plate frame 45 have a

long hole. Therefore, the position of the image pickup unit 47 is adjusted within a predetermined range and the image pickup unit 47 is adjacent to the proper position, preferably, the inner peripheral surface of the exterior portion of the grip portion 11. The image pickup unit 47 is compactly fixed at the position where space in the grip portion 11 can be wide.

[0040]

The image pickup unit 47 is arranged at the position deviated from the center portion of the grip portion 11. As compared with the arrangement of the image pickup unit 47 near the center, the image pickup unit 47 is easily subjected to the optical adjustment.

[0041]

Referring to Fig. 5, a flange portion 69 is arranged at the front end portion of the image pickup unit 47, adjacently to the screw 58, in other words, at the front end portion of the fixing frame 57 in the example. The flange portion 69 regulates the movement of the edge of a driver at an erroneous position which is caused by the slide of the driver edge or the like upon adjusting the screw 59 with the driver, and the contact state of the driver edge with the image guiding fibers 19 is prevented.

[0042]

Referring to Fig. 3(B), the front end side of the notch portion 45a may diagonally be notched as shown by a dotted line L from a shape shown by a solid line so as to provide the notch portion 45a for the frame 45. Thus, the sandwiching of the image guiding fibers 19 by the front end portion of the notch portion 45a is solved upon fixing the image pickup unit 47 to the notch portion 45a.

[0043]

According to the first embodiment, the image pickup unit 47 has the CCD 54 which picks up the optical image transmitted by the image guiding fibers 19 and which photoelectrically converts the optical image. The image pickup unit 47 is arranged to the notch portion 45a which is formed to the fame 45 as the internal structure in the grip portion 11 on the front end side of the operating portion 3, and is fixed to the frame 45 by the attaching member 63. As a consequence, the image

pickup unit 47 is fixed to the frame 45 by the attaching member 63 and, therefore, the endoscope 1 for compactly accommodating the image pickup unit 47 is realized with the simple structure while the predetermined strength is ensured.

[0044]

The image pickup unit 47 is arranged at the position of the notch portion 45a deviated from the center of the grip portion 11, and the optical adjustment or maintenance of the image pickup unit 47 is easy.

[0045]

That is, as compared with the case of arranging the image pickup unit 47 near the center of the grip portion 11, the center of the output end surface 19a of the image guiding fibers 19 is deviated from the optical axis of the relay optical system 53 as a result of the use of the image pickup unit 47 for a long time and, then, the optical axis is easily corrected by the position adjusting using the screw 58 or the like.

[0046]

Specifically, referring to Fig. 4(E), the image pickup unit 47 is deviated and attached and therefore the image pickup unit 47 is re-arranged by using the screw 58 from three directions while the image pickup unit 47 is attached to the frame 45 via the attaching member 63.

[0047]

According to the first embodiment, advantageously, the image pickup unit 47 includes the CCD 54 which picks up the optical image transmitted by the image guiding fibers 19 and which photoelectrically converts the image, and it is compactly accommodated in the grip portion 11 on the front end side of the operating portion 3 with the simple structure while assuring the predetermined strength.

[0048]

The image pickup unit 47 according to the first embodiment has the structure having waterproof means.

[0049]

(a) For example, referring to Fig. 5, the optical image transmitted by the relay optical system 53 is formed onto the image pick-up surface of the CCD 54 so that the

position of the lens frame 65 is adjusted. Then, the CCD frame 54a and the lens frame 65 are watertightly fixed with an adhering agent.

[0050]

(b) Referring to Fig. 3(B), the image pickup unit 47 has a simple waterproof structure which is obtained by winding a waterproof film sheet 70 shown by a two-dotted line to the image pickup unit 47. The waterproof sheet 70 is not wound to the periphery portion of the attaching member 63 and therefore a stick member such as an O ring may partly be used.

[0051]

As mentioned above, the following advantages are obtained with the structure having the waterproof structure portion.

That is, since the lens frame 65 is adhered to the CCD frame 54a, the flow of a solution such as water from the fitting portion toward the CCD 54 is prevented.

Further, since the entire image pickup unit 47 has a simple waterproof structure, the image pickup unit 47 does not easily come into contact with the solution such as water.

[0052]

The inspection of periphery devices after/before the endoscope examination generally detects a trouble of the exterior member 35 or damage of the waterproof structure of the grip portion 11. That is, as shown by the structures (a) and (b), the structure for preventing the easy flow of the solution into the CCD 54 prevents the trouble of the expensive CCD 54 upon the damage of the waterproof structure of the endoscope 1.

According to the first embodiment, the image pickup unit 47 is described as an example and, alternatively, an electronic device other than the image pickup unit may be arranged.

[0053]

[Note]

1. An endoscope comprises:

a long inserting portion; and

an operating portion that is arranged on the base end side of the inserting portion and that has a grip portion capable of being gripped by an operator.

The endoscope further comprises:

an electric device forming the endoscope;

an internal structure arranged in the operating portion, which is inserted in the grip portion from the base end side thereof to the edge side;

a notch portion arranged to the internal structure; and

electric device arranging means that is arranged to the internal structure and arranges the electric device to the notch portion.

[0054]

[Advantages]

As described above, according to the present invention, an endoscope comprises:

an elongated inserting portion; and

an operating portion that is arranged at the rear end of the inserting portion and includes a grip portion gripped by an operator.

In the endoscope, the operating portion has therein a plate frame and the plate frame has a notch portion to arrange an image pickup unit. By arranging the plate frame in the operating portion and arranging the image pickup unit with the notch portion arranged to the frame, the necessary strength can be ensured and the image pickup unit can be compactly accommodated.

[Brief Description of the Drawings]

[Fig. 1]

Fig. 1 is a perspective view showing the appearance of an endoscope according to the first embodiment.

[Fig. 2]

Fig. 2 is a cross-sectional view showing the internal configuration of an inserting portion on the edge side thereof.

[Fig. 3]

Fig. 3 is a cross-sectional view showing the internal configuration and the like

of an operating portion.

[Fig. 4]

Fig. 4 shows the internal configuration on the front side shown in Fig. 3.

[Fig. 5]

Fig. 5 shows the configuration of an image pickup unit.

[Reference Numerals]

1: endoscope

2: inserting portion

3: operating portion

4: universal cord

5: connector

8: edge portion

11: grip portion

12: bending lever

18: objective pens system

19: image guide fibers

35: exterior member of grip portion

52: fiber supporter

47: image pickup unit

53: relay optical system

54: CCD

56: signal cable

51: cap

45: frame

45a: notch portion

65: lens frame

63: attaching member

58, 62: screw

57: fixing frame

59: outer frame

Patent Attorney: Susumu ITO

[Name of Document] ABSTRACT

[Abstract]

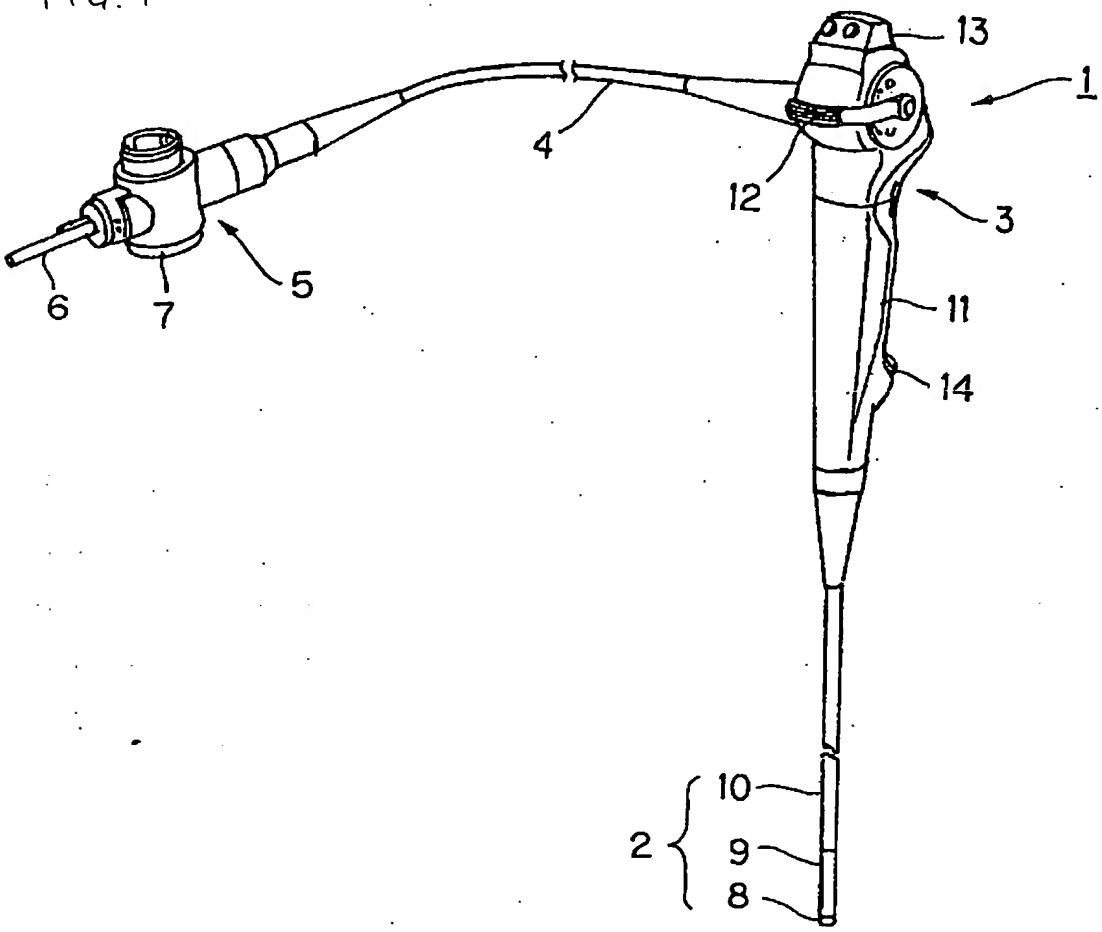
[Object] To provide an endoscope that can ensure predetermined strength and can compactly accommodate an image pickup unit with a simple structure.

[Solving Means] An operating portion 3 having a bending lever 12 for bending operation is formed at the rear end of an inserting portion. On the front end side of operating portion, a grip portion 11 which is gripped by an operator is formed. In the grip portion, a plate frame 45 is arranged as an internal structure for ensuring predetermined strength. At a notch portion 45 obtained by partly notching the frame 45, an image pickup unit 47 is arranged to form an optical image sent via image guide fibers 19 to a CCD 54 via a relay optical system 53. The image pickup unit 47 is fixed to the frame 45 via an attaching member 63. As a consequence, the image pickup unit is compactly accommodated.

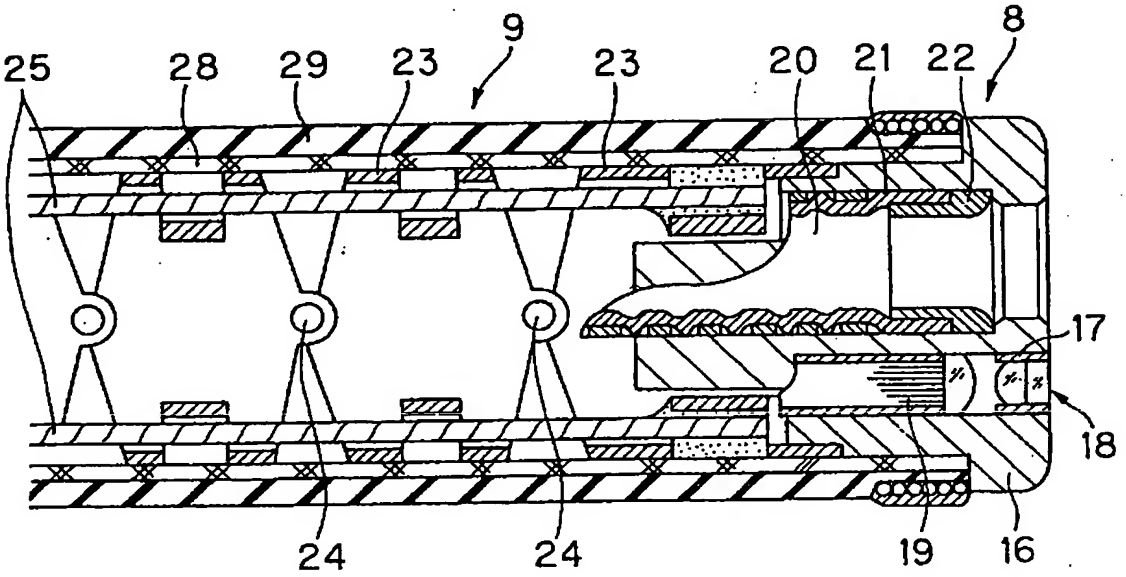
[Selected Figure] Fig. 3

【書類名】　図面　DRAWINGS
NAME OF THE DOCUMENT

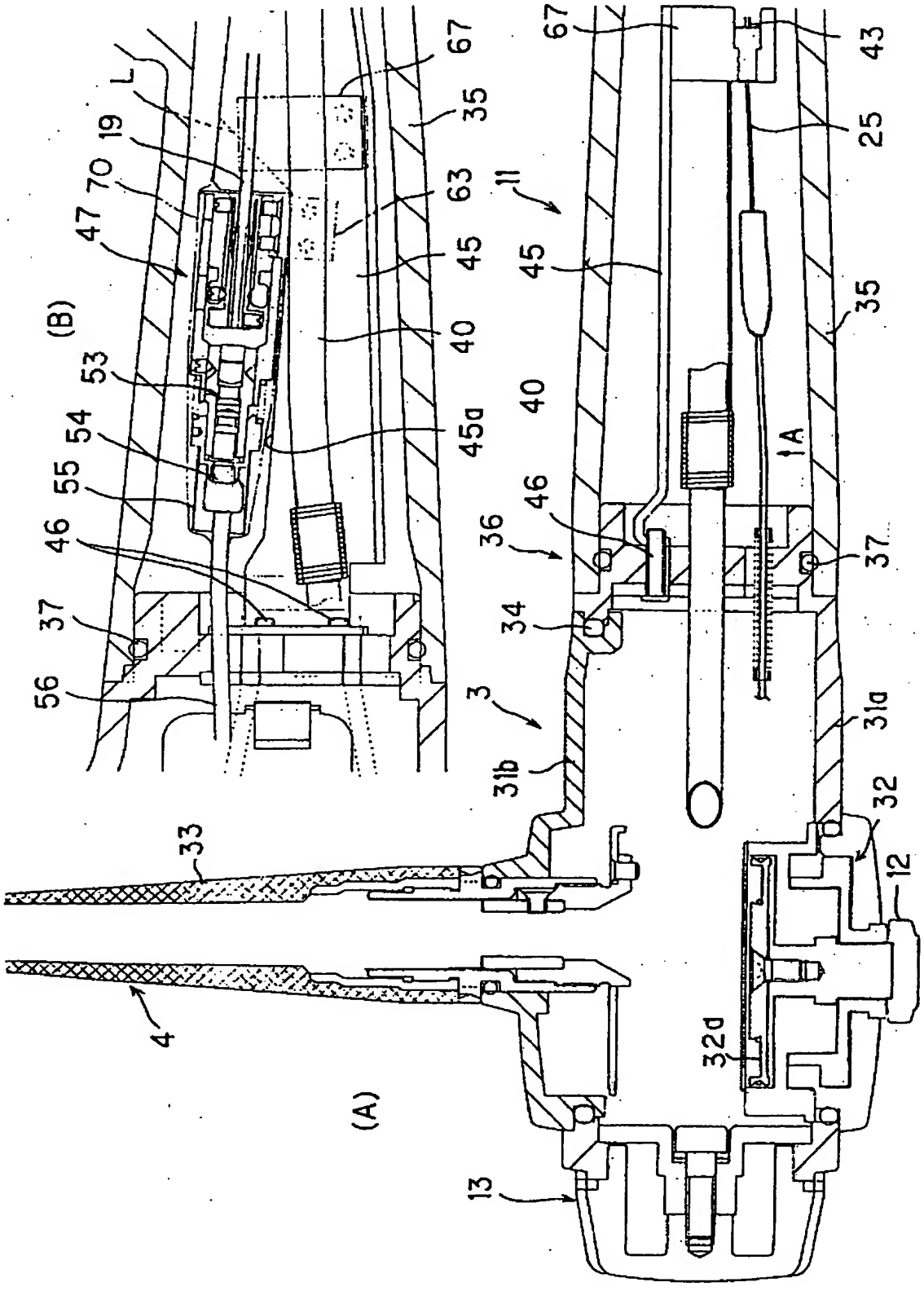
【図１】
FIG. 1



【図２】
Fig. 2



【図３】
FIG 3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55
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36
46
37
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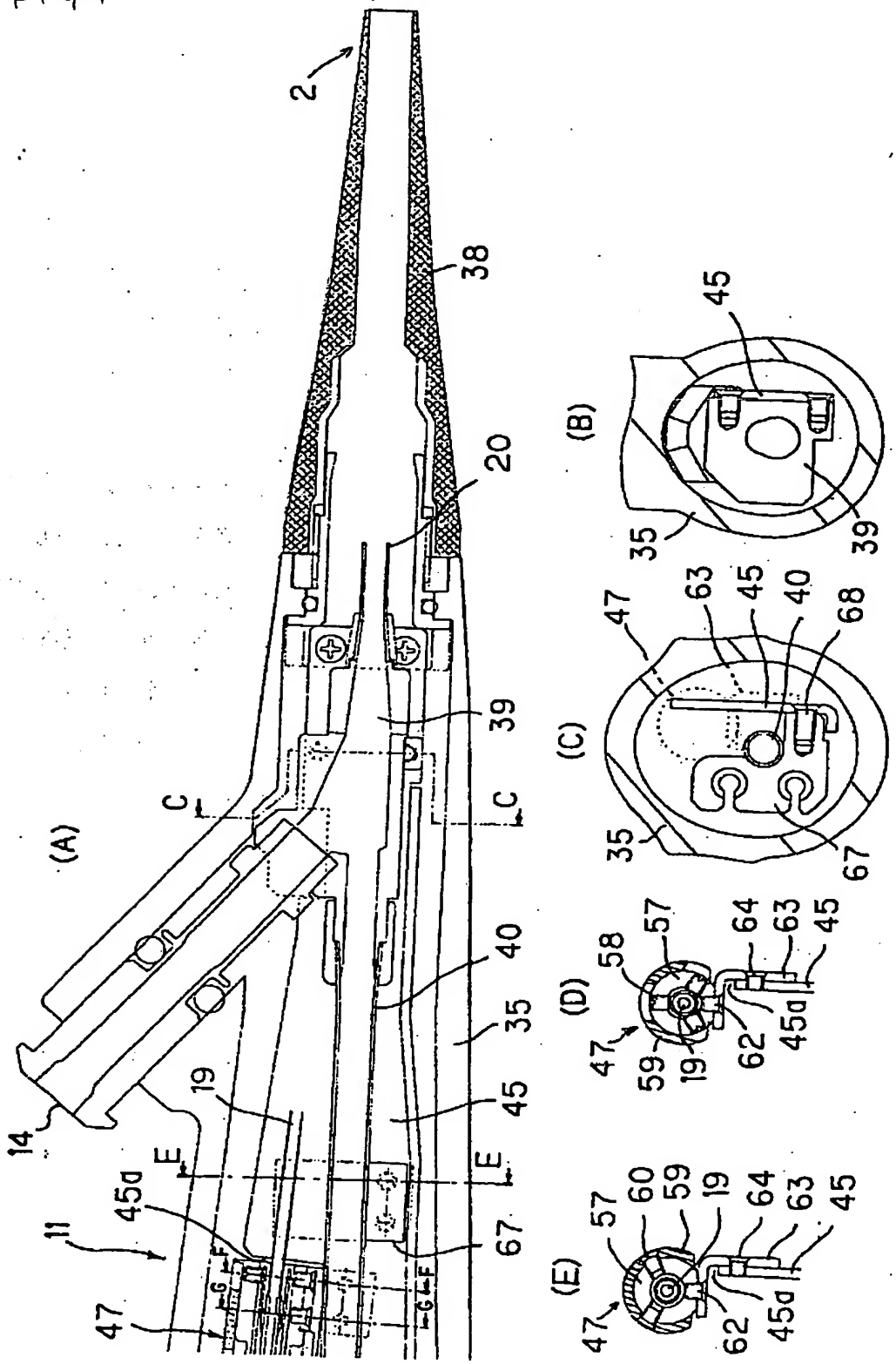
32d
(A)
13

【図４】
FIG 4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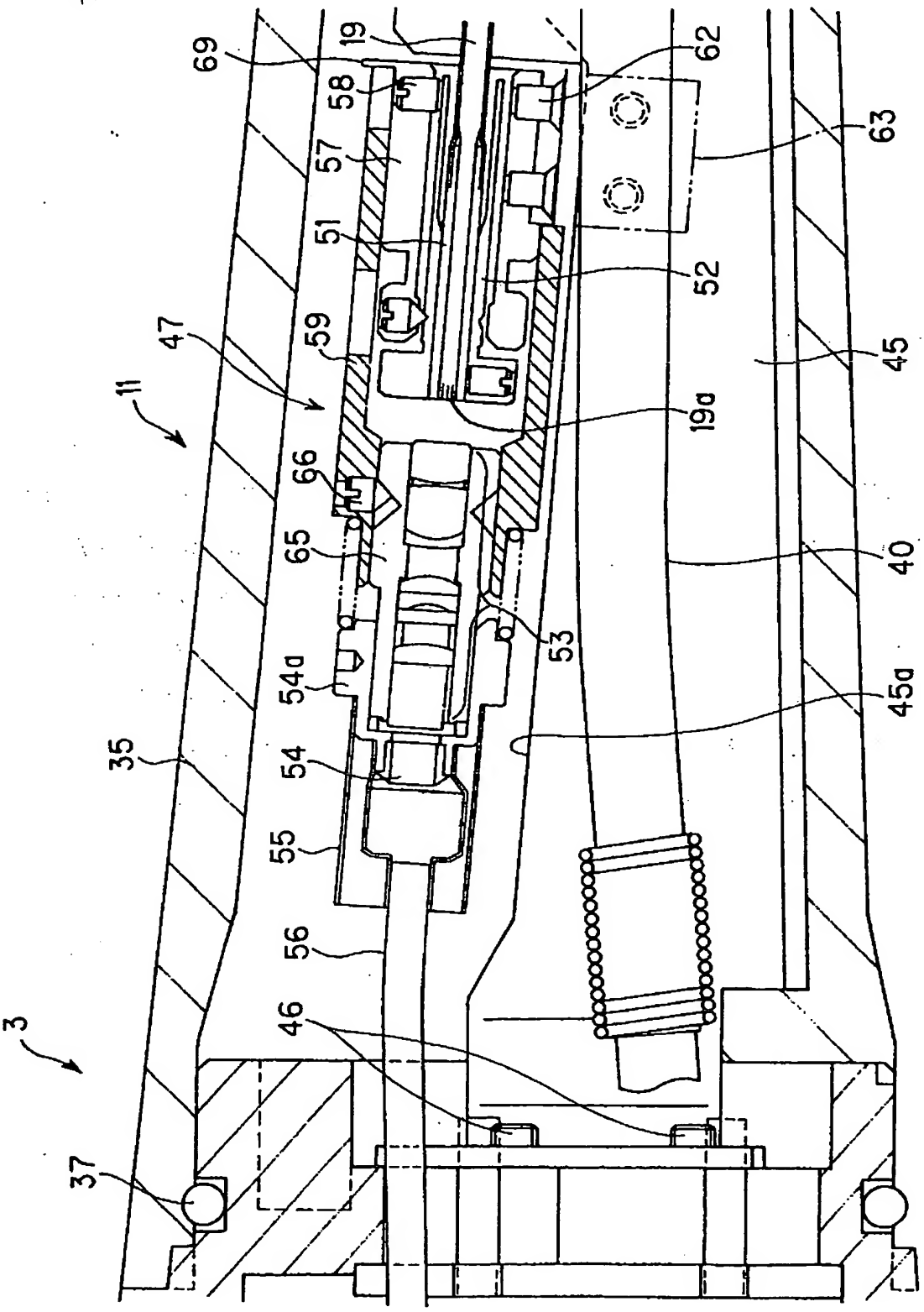
20
39
C
C
(A)
40
35
19
45
14
E
E
45a
11
67
47
(B)
45
35
39
(C)
47
63
45
40
68
35
67
(D)
58
57
64
63
45
47
59
19
62
45a
(E)
57
60
59
19
64
63
45
47
62
45a

【図５】

FIG. 5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